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JC971 U.S. PRO

09/859558



9-2401

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Patent Application

Of: Gan et al.

For: Control Of Cell Swelling By The Proper Choice Of Carbon Monofluoride (CF<sub>x</sub>) Cathode Materials In High Rate Defibrillator Cells

the specification of which is being transmitted herewith

Assistant Commissioner of Patents  
Washington, D.C. 20231

**INFORMATION DISCLOSURE STATEMENT**

**Pursuant to 37 CFR 1.56**

1. Applicants submit herewith patents, publications or other information of which they are aware, which they believe may be material to the examination of this application and in respect of which there may be a duty to disclose in accordance with 37 CFR 1.56.

The filing of this Information Disclosure Statement (IDS) shall not be construed as a representation that a search has been made (37 CFR 1.56(g)), an admission that the information cited is, or is considered to be material to patentability or that no other material information exists.

IDS For: Control Of Cell Swelling By The Proper  
Choice Of Carbon Monofluoride ( $CF_x$ ) Cathode  
Materials In High Rate Defibrillator Cells  
Inventor: Gan et al.

The filing of this IDS shall not be construed as an admission against interest in any manner (Notice of Jan. 9, 1992, 1135 O.G. 13-25, at 25).

2. Attached is Form PTO-1449. Legible copies of all items listed accompany this IDS.

3. A concise explanation of the possible relevance of the listed information items is as follows:

**Patents:**

U.S. Patent No. 5,116,592 to Weinberg discloses a method for fluorinating virtually "all forms of carbons, including powders, fibers, flakes, as well as solid masses of any crystallographic orientation, crystallite size, interlayer spacing, interatomic distance, density, porosity, particle size or shape." Column 5, lines 19 to 23. The patented method includes preoxidizing the carbon material and thereafter fluorinating it. Then, the fluorinated carbonaceous products may be incorporated into electrochemical cells, electrodes, and the like. The preoxidation step may be used to prepare discontinuities, edge sites and grain boundaries in carbons, improving instabilities for oxidative corrosion and degradation as taught in U.S. Patent No. 4,908,198, also to Weinberg. The '198 patent to Weinberg teaches that a fluorination step may be affected with "soft" fluorinating agents such as sulfur tetrafluoride and the like.

U.S. Patent No. 4,737,423 to Tung describes fluorinating a heated carbon having a lattice spacing of 3.37

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Angstroms or greater. An alkanol wash follows the fluorination of the material. This patent states that commercially available coke has a lattice constant  $d_{002}$  between 3.44 and 3.49 Å.

U.S. Patent No. 4,271,242 to Toyoguchi et al. relates to producing cathode materials by fluorinating carbon having a lattice constant  $d_{002}$  of 3.4 - 3.5 Å. Material sources include graphite as well as amorphous carbon such as acetylene black, charcoal, petroleum coke and coal coke. These materials are stated to improve the shelf life of batteries manufactured from them.

U.S. Patent No. 5,712,062 to Yamana et al. teaches a process for preparing carbon fluoride particles comprising preheating a carbon powder having a specified particle size distribution, introducing a fluorine gas, and then reacting the carbon particles with the fluorine gas at an elevated temperature. Yamana et al. believe that fluoride is present in a relatively large amount about the shell portion of the resulting core structures and that stress occurs only near the surface region. Because stress is not present in deeper portions or the core of the particles, breakage does not occur over the whole of the particle.

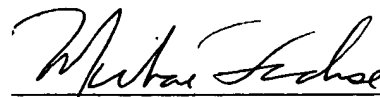
4. The remaining patents on the attached Form PTO 1449 were located during a patentability search.

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5. The person making this statement is the agent who signs below, who makes this statement on the information supplied by the inventors and the information in the agent's file.

Respectfully submitted,

By:



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